



Catechol-Modified Activated Carbon Prepared by the Diazonium Chemistry for Application as Active Electrode Material in Electrochemical Capacitor

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Résumé en anglais

Activated carbon (Black Pearls 2000) modified with electroactive catechol groups was evaluated for charge storage application as active composite electrode material in an aqueous electrochemical capacitor. High surface area Black Pearls 2000 carbon, was functionalized by introduction of catechol groups by spontaneous reduction of catechol diazonium ions in situ prepared in aqueous solution from the corresponding amine. Change in the specific surface area and pore texture of the carbon following grafting was monitored by nitrogen gas adsorption measurements. The electrochemical properties and the chemical composition of the catechol-modified carbon electrodes were investigated by cyclic voltammetry. Such carbon-modified electrode combines well the faradaic capacitance, originating from the redox activity of the surface immobilized catechol groups, to the electrochemical double layer capacitance of the high surface area Black Pearls carbon. Due to the faradaic contribution, the catechol-modified electrode exhibits a higher specific capacitance (250 F/g) than pristine Carbon (150 F/g) over a potential range of -0.4 to 0.75 V in 1 M H₂SO₄. The stability of the modified electrode evaluated by long-time 1 charge/discharge cycling revealed a low decrease of the capacitance of the catechol-modified carbon due to the loss of the 1 catechol redox activity. Nonetheless, it was demonstrated that the benefit of redox groups persists for 10 000 constant current charge/discharge cycles.

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